LWG Comments on the NOAA/NMFS Habitat Values for Salmonids

A mitigation matrix is being developed in order to determine the mitigation requirements under Section 404 of the Clean Water Act (CWA) as well as provide a common basis for expected mitigation requirements for analyzing alternatives in the Feasibility Study (FS) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. In addition, the mitigation activities also provide benefits under the ESA to listed species and critical habitat. Relative habitat values developed for juvenile Chinook salmon by an expert panel for Natural Resource Damage (NRD) purposes ("Expert panel Chinook salmon values"), an updated table presented by NMFS to include additional life stages and listed species ("NMFS salmonid values"), and other available scientific information are being used to develop relative habitat values as an input into the mitigation matrix. The matrix will help determine mitigation ratios that will result from implementing specific remedial activities.

In considering habitats in the Portland Harbor Superfund Site (Superfund Site), the LWG believes a range of values is necessary to capture the variability in certain habitat categories based on site-specific characteristics. For example, vegetated banks may include some invasive species and some natives. The value for a "vegetated bank, invasive" would therefore vary based on the percent cover of invasive species as compared to percent cover of natives. This approach also recognizes the natural variability that exists within the Superfund Site and is consistent with the Willamette Partnership's Counting on the Environment salmon calculator methodology (http://willamettepartnership.org/ecosystem-credit-accounting/salmon-habitat) because it takes into account the fact that not all habitat types are equal in terms of habitat function. This methodology was developed in part by a salmonid focus group convened by The Willamette Partnership's Counting on the Environment program, which has been supported by 27 state and federal natural resource management agencies and other non-profit stakeholders, including the State of Oregon, NRCS, Oregon Department of Transportation, U.S. Forest Service, EPA, Oregon Watershed Enhancement Board, Defenders of Wildlife, City of Albany, Oregon Department of Agriculture, Oregon Department of Forestry, Oregon Department of State Lands, Oregon Department of Environmental Quality, Oregon Department of Fish and Wildlife, Clean Water Services, Institute for Natural Resources, Mud Slough Wetland Mitigation Bank, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, City of Eugene, Ecotrust, the Nature Conservancy, The Freshwater Trust, and Willamette Partnership.

To demonstrate the need for a range of values, a few examples are noted. Not all existing vegetated slopes provide actual habitat value that falls in the range of 0.8 to 1.0, as suggested by the NMFS salmonid values. To better assess the ecological function provided by an existing slope, its vegetation layers and species richness should be assessed, rather than solely its classification as "vegetated". Furthermore, a low value for bioengineered slopes may be appropriate for some low intensity bioengineering applications that yield few species or vegetation layers (e.g., shrubs with no trees). However, more intense bioengineering applications can yield complex vegetation canopies with many layers (e.g., ground cover, shrubs, and trees) and provide functions that are similar to naturally vegetated slopes. Such bioengineering designs may provide high value even if rock is incorporated. For in-water habitat types, substrate size smaller than sand/gravel may not be indicative of productive habitat that is valued as a 1. Some fine substrates may not support a fully functional benthic community and therefore may not provide as productive, high value habitats to salmonids. Unnatural, anthropogenic debris may

also compromise shallow water habitats with otherwise suitable substrates, thereby decreasing the existing value of the habitat.

In the table below, proposed ranges of habitat values have been added for certain habitat categories under the "LWG-proposed values for salmonids" column along with a justification for the range. These ranges are provided in order to account for the variability in habitat categories. The relative habitat values refer to habitats within a given category (i.e., riparian, active channel margin, etc) and are specific to migratory salmonids. The values reflect relative value of the habitat categories to one another. All of these values will be applied to both existing and proposed conditions as part of the application in the mitigation matrix. The habitat values will be used in the mitigation matrix to identify potential mitigation requirements (debits or credits) resulting from the implementation of a remedial technology as follows:

Acres of mitigation debit (-) or credit (+) = (Proposed habitat value – Existing habitat value) * Acres of impacted habitat

- An example of how the values will be used in the matrix to determine potential acres of mitigation debit or credit for evaluation in the FS is provided below. Assume capping with a surface layer of riprap armor is an alternative proposed over one acre of an active channel margin.
- Assume the existing slope is steep (>5:1), unarmored, and vegetated with native species. The relative habitat value for this condition (using the LWG proposed values) ranges from 0.2 to 0.8 depending on vegetative complexity (i.e., layers), species richness, stem densities, canopy cover, and steepness of the slope.
- Assume the proposed slope will also be steep (>5:1) and will be armored with riprap over the 1-acre area that the cap is proposed. The relative habitat value for this condition (using the LWG proposed values) is 0.1 since the slope would remain steep and the density of riprap would be high with minimal areas of natural substrate.
- For the FS, no surveys to determine the complexity of the vegetation, species richness, stem densities, or canopy cover will be performed. As such, the potential mitigation debit/credit will result in a range to account for the varying existing conditions that could occur in the Superfund Site. Using the equation above to account for both ends of the range of existing conditions, the potential acres of mitigation debit would range from -0.1 to -0.7.

Habitat	Habitat Characteristics	Expert Panel Chinook Salmon Value	NMFS Salmonid Value	LWG-Proposed Values for Salmonids	LWG Justification
Riparian	Naturally vegetated forest, <400 ft from ACM[1, 2]	0.5	0.5	0.5	No proposed change
	and in the historic floodplain	0.65	0.65	0.65	No proposed change
	Naturally vegetated, grass/shrub	0.2	0.2	0.2	No proposed change
	and associated with historic floodplain	0.35	0.35	0.35	No proposed change
	Invasive species[3]	0.1	0.1	0.1 – 0.3	Based on level of establishment of invasive community vs. remaining natives, range from mostly invasive (0.1) to 50% (by cover) invasive species (0.3)
	Vegetated riprap and bioengineering treatments	No value provided	0.05	0.05 – 0.5	Based on the complexity of vegetation layers, species richness, stem densities, and canopy cover. Range from few species and vegetation layers (e.g., shrubs with no trees), and low stem density and canopy cover (0.05) to complex layers with multiple species (e.g., ground cover, shrubs, and trees) high stem density and canopy cover that provide functions similar to natural habitat (0.5).
	Unvegetated/paved/buildings/riprap	No value provided	0	0	No proposed change
Active Channel Margin	Sloped (<5:1), unarmored and vegetated[4]	1	1	0.4 – 1	Based on vegetative complexity (i.e., layers) and species richness, stem densities, and canopy cover. Range from few species and vegetation layers (e.g., shrubs with no trees), and low stem density and canopy cover (0.4) to complex layers with multiple species (e.g., ground cover, shrubs, and trees) high stem density and canopy cover that provide functions similar to natural habitat (1). "Unarmored" includes situations where sand and gravel substrate is either placed or deposits naturally over an engineered cap, and is stable or dynamically stable in a manner similar to the native substrate (see new footnote 9).

Habitat	Habitat Characteristics	Expert Panel Chinook Salmon Value	NMFS Salmonid Value	LWG-Proposed Values for Salmonids	LWG Justification
	Sloped (>5:1), unarmored and vegetated[4]	0.2	0.8	0.2 - 0.8	Based on vegetative complexity (i.e., layers), species richness, stem densities, canopy cover, and steepness of the slope. Range from few vegetation layers (e.g., shrubs with no trees) and species, low stem density and canopy cover with very steep slope (>3:1) (0.2) to multiple vegetation layers and species, high stem density and canopy cover with less steep slope (<3:1 and >5:1) (0.8). "Unarmored" includes situations where sand and gravel substrate is either placed or deposits naturally over an engineered cap, and is stable or dynamically stable in a manner similar to the native substrate (see new footnote 9).
	Sloped (>5:1), unarmored and vegetated with invasives			0.1 – 0.6	Based on level of establishment of invasive community vs. remaining natives, and steepness of the slope. Range from mostly invasive with steep slope (>3:1) (0.1) to 50% (by cover) invasive species with less steep slope (<3:1 and >5:1) (0.6). "Unarmored" includes situations where sand and gravel substrate is either placed or deposits naturally over an engineered cap, and is stable or dynamically stable in a manner similar to the native substrate (see new footnote 9).
	Sloped (<5:1), unarmored and unvegetated	0.8	0.8	0.2 - 0.8	Based on varying substrate conditions associated with the slope—i.e., sand/gravel (0.8) to larger rock (0.2). "Unarmored" includes situations where sand and gravel substrate is either placed or deposits naturally over an engineered cap, and is stable or dynamically stable in a manner similar to the native substrate (see new footnote 9).
	Sloped (>5:1), unarmored and unvegetated		0.1	0.1 – 0.3	Based on slope stability; range from eroding shoreline (0.1) to a more stable shoreline (0.3). "Unarmored" includes situations where sand and gravel substrate is either placed or deposits naturally over an engineered cap, and is stable or dynamically stable in a manner similar to the native substrate (see new footnote 9).

Habitat	Habitat Characteristics	Expert Panel Chinook Salmon Value	NMFS Salmonid Value	LWG-Proposed Values for Salmonids	LWG Justification
	Sloped (<5:1), bio-engineered	0.4	0.2	0.2 – 0.8	Based on vegetation complexity (i.e., layers), species richness, stem densities, canopy cover, and steepness of the slope. Range from few species or vegetation layers (e.g., shrubs with no trees), low stem density and canopy cover (0.2) to complex layers with multiple species (e.g., ground cover, shrubs, and trees), high stem density and canopy cover, that provide functions similar to natural habitat (0.8).
	Sloped (>5:1), bio-engineered	0.2	0.2	0.2 – 0.8	Based on vegetation complexity (i.e., layers), species richness, stem densities, canopy cover, and steepness of the slope, range from few species or vegetation layers (e.g., shrubs with no trees), low stem density and canopy cover with a very steep slope (>3:1)(0.2) to complex layers with multiple species (e.g., ground cover, shrubs, and trees), high stem densities and canopy cover that provide functions similar to natural habitat with a less steep slope (<3:1 and >5:1) (0.8).
	Riprap, concrete, or other artificial debris	0.1	0	0.1 – 0.3	Riprap in the active channel margin that is inundated provides some, although very limited, habitat value to salmonids. Values depend on density of the riprap, concrete, or other artificial debris. Range from low density where areas of natural substrate are frequent (0.3) to high density with minimal areas of natural substrate (0.1).
	Sheetpile	0	0	0	No proposed change
	Pilings (1 per 100 square feet)	½ value of margin type	½ value of margin type	½ value of margin type	No proposed change other than this value should apply for debits as well as credits (see LWG comment on NMFS Notes at end of the table).
	Covered structures over channel margins[5]	Max. of 0.1	0.1	½ value of the margin type	Based on the Notes at the bottom of the page that will allow for a maximum of 0.5 credit for removal of covered structures (0.5 is ½ of the highest valued habitat type).

Habitat	Habitat Characteristics	Expert Panel Chinook Salmon Value	NMFS Salmonid Value	LWG-Proposed Values for Salmonids	LWG Justification
Main channel	Shallow water, gravel and finer substrates • 0 to 10 feet of water depth from OLW • 10 to 20 feet of water depth from OLW	1	1	0.8 – 1 0.4	Based on substrate variability in the 0 to 10 feet of water depth from OLW zone; Finer, muddy substrates may not support productive benthic community, thereby reducing value. Variability in the 10 to 20 feet of water depth from OLW is more limited. This includes situations where sand and gravel substrate is either placed or deposits naturally over an engineered cap, and is stable or dynamically stable in a manner similar to the native substrate (see new footnote 9).
	Shallow water, natural rock outcrop[6] • 0 to 10 feet of water depth from OLW • 10 to 20 feet of water depth from OLW	1	1	0.8 – 1 0.3	Natural rock outcrop could be in the vicinity of variable substrate conditions as described above for shallow water, gravel and finer substrates.
	Shallow water, moderate substrate size (rounded rock larger than sand/gravel, but smaller than riprap) • 0 to 10 feet of water depth from OLW • 10 to 20 feet of water depth from OLW			0.4 – 0.6 0.2	Values depend on density of the moderate substrate size. Range from low density where areas of smaller sand/gravel substrate are frequent (0.6) to high density with minimal areas of smaller sized substrate (0.4). This includes situations where moderate size substrate is either placed or deposits naturally over an engineered cap, and is stable or dynamically stable in a manner similar to the native substrate (see new footnote 9).
	Shallow water with riprap, concrete, or other artificial debris • 0 to 10 feet of water depth from OLW • 10 to 20 feet of water depth from OLW	0.1	0.1	0.1 – 0.5 0.1	Values in 0 to 10 feet of water depth depend on density of the riprap, concrete, or other artificial debris. Range from low density where areas of natural substrate are frequent (0.5) to high density with minimal areas of natural substrate (0.1).
	Shallow water with covering structures[5] • 0 to 10 feet of water depth from OLW • 10 to 20 feet of water depth from OLW	0.1	0.1	½ value of the channel type	Based on the Notes at the bottom of the page that will allow for a maximum of 0.5 credit for removal of covered structures (0.5 is ½ of the highest valued habitat type).

Habitat	Habitat Characteristics	Expert Panel Chinook Salmon Value	NMFS Salmonid Value	LWG-Proposed Values for Salmonids	LWG Justification
	shallow water with pilings (1 per 100 square feet)	0.5	½ value of channel type	½ value of channel type	No proposed change
	Deep water with natural substrates	0.1	0.1	0.1	No proposed change
	Deep water with artificial substrates	0.05	0.05	0.05	No proposed change
	"Cold" water tributary	1	1	1	No proposed change
Off channel	"Warm" water tributary	0.9	0.9	0.9	No proposed change
	Side channel	1	1	1	No proposed change
	Alcove or slough with tributary	1	1 [7]	1 [7]	No proposed change
	Alcove or slough without tributary	0.8	0.8	0.8	No proposed change
	Embayment (cove) with tributary	1	1 [7]	1 [7]	No proposed change
	Embayment (cove) without tributary	0.8	0.8 [8]	0.8 [8]	No proposed change

Notes:
1 ACM = active channel margin
2 Achieves 80% of full function within 10 years; this time is adequate because of flood protection
3 e.g., Himalayan blackberry
4 Native species
5 e.g., docks
6 Cannot be created
7 Value is 0.9 for salmonid adults if "warm" water tributary
8 Value is 0.6 further upstream
9 Engineering analysis and/or monitoring is anticipated to be necessary to demonstrate that materials overlying an engineered cap persist and are available to provide the anticipated ecological function.

NMFS NOTES

-Debits and credits for a given project need to come from the same habitat category (eg. main channel), unless credits come from creating off channel habitat because it is a primary limiting factor for salmonids.

LWG COMMENT: Debits and credits should be transferable between habitat types. The primary value of a HEA approach is the conversion of credits and debits into a currency that can be applied between habitat types and provides incentive for creative mitigation.

-No credit will be given for creating any new habitat with riprap, artificial substrates, pilings or covering structures.

LWG COMMENT: Values should be applied consistently whether as a debit (impact) or a credit (mitigation).

- Credit for simply removing pilings is limited to 0.1 and for removing covering structures is limited to 0.5.

LWG COMMENT: Values should be applied consistently whether as a debit (impact) or a credit (mitigation). If covering structures or pilings are assumed to result in large reductions in functions, then their removal must result in the same magnitude of benefit.

-For ESA purposes, shallow water habitat is defined as <20 feet of water depth as measured at the ordinary low water elevation.

LWG Comment: Shallow water is defined as 20 feet of water depth from OLW and updated values place a higher value on the 0-10 feet of water depth from OLW. The higher value for salmonids between 0 and 10 feet of water depth is supported by results of studies conducted on the Lower Willamette and Columbia Rivers. Specifically, ODFW (2005) found that catches of juvenile salmonids were generally higher at sites with shallow depths between 0 and 3 meters (10 feet) than at deeper depths. In addition, a number of studies have shown that salmon fry and fingerlings often remain in water depths between approximately 10 centimeters and 2 meters (6.6 feet) (NMFS 2005).

Oregon Department of Fish and Wildlife (ODFW). 2005. Biology, Behavior, and Resources of Resident and Anadromous Fish in the Lower Willamette River, Final Report of Research, 2000-2004. Edited by Thomas Friesen, ODFW. Prepared for City of Portland Bureau of Environmental Services, Endangered Species Act Program.

NMFS. 2005b. Salmon at River's End: The Role of the Estuary in the Decline and Recovery of Columbia River Salmon. NOAA Technical Memorandum NMFS-NWFSC-68. August 2005.

- Bio-engineering is defined as the use of living and nonliving plant materials in combination with natural and synthetic support materials for slope stabilization, erosion reduction, and vegetative establishment. To receive credit for bio-engineered ACM, the treatments may include inert components and grading but they must fundamentally rely on riparian plants to provide long term strength to the bank. Inert material may be used but generally only to temporarily reduce hydraulic pressures so that the planted live material can become established. NMFS must appove any proposal for bio-engineered ACM for credit to be given.

LWG Comment: The LWG does not agree with this definition of bio-engineering, but it is less important if we focus on the true characteristics of a site, rather than categories.